IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Komma et al.	Examiner:	Unknown
Serial No.:	10/010721	Group Art Unit:	Unknown
Filed:	11/13/2001	Docket No.:	10873.850US01
Title:	DIFFRACTION GRATING BODY, OPTICAL PICK-UP, SEMICONDUCTOR LASER APPARATUS AND OPTICAL INFORMATION APPARATUS		

CERTIFICATE UNDER 37 CFR 1.10:
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By: _____
Name: Chris Stordahl

PRELIMINARY AMENDMENT

BOX MISSING PARTS
Assistant Commissioner for Patents
Washington, D. C. 20231

Dear Sir:

In connection with the above-identified application, please enter the following preliminary amendment:

IN THE SPECIFICATION

Please amend the paragraph of page 7 starting on line 32 as follows:

Furthermore, it is preferable that an anti-reflection film in the interface between the base material having a refractive index n1 and the air, and the interface between the base material having the refractive index n1 and the base material having a refractive index n0. With such a diffraction grating, the transmissivity can be improved securely.

Please amend the paragraph of page 9 starting on line 14 as follows:

Furthermore, the optical pick-up according to the present invention is provided with each

of the above-mentioned diffraction grating bodies and includes a first semiconductor laser light source for emitting a light beam with wavelength λ1; a second semiconductor laser light source for emitting a light beam with wavelength λ2; an optical system for receiving the light beam with wavelength λ1 and the light beam with wavelength λ2 and converging the light beam onto a microspot on the optical disk; a diffraction means for diffracting a light beam reflected from the optical disk; and a photodetector having a photo detecting portion for receiving the diffracted light diffracted by the diffraction means to output electrical signals in accordance with the amount of the diffracted light; wherein the diffraction grating body receives the light beam with wavelength λ2 and transmits a main beam and generates sub-beams that are ±first order diffracted light.

Please amend the paragraph of page 19 starting on line 21 as follows:

P4A, P4B, P4C and P4D are +first order diffracted light diffracted by the hologram 4. M4A, M4B, M4C and M4D are .first order diffracted light diffracted by the hologram 4. The hologram 4 is divided into at least four parts by an x-axis and a y-axis. The hologram is designed so that P4A and M4A are diffracted by the region 4A, P4B and M4B are diffracted by the region 4B, P4C and M4C are diffracted by the region 4C, and P4D and M4D are diffracted by the region 4D. In Figure 8, only a part of the hologram 4 is shown as an red light 4R on the hologram. The hologram 4 is formed in a range broader than 4R.

Please amend the paragraph of page 22 starting on line 27 as follows:

Furthermore, by forming the region 82 of the five strip-shaped divided regions, it is possible to separate the diffracted light M4D from the diffracted light M4A appropriately. Furthermore, it is possible to separate the diffracted light M4B from the diffracted light M4C appropriately. Accordingly, the conjugated lights thereof can be separated, that is, the diffracted light P4D can be separated from P4A appropriately. Similarly, the diffracted light P4B can be separated from P4C appropriately. Therefore, in the photo detecting portion 81, signals of the four diffracted lights can be detected separately and thus TE signals can be obtained by the phase difference method more excellently.

Please amend the paragraph of page 22 starting on line 37 as follows:

Figure 10 shows an operation of recording or reproducing information from a CD optical disk by allowing an infrared light to be emitted in the same configuration as in Figure 8. When the gap between the CD optical disk 72 and the objection lens in the direction of the optical axis is shifted, that is, when defocusing occurs, the magnitude of the diffracted light on the photo detecting portion 83 changes. The change is a reverse movement with respect to the difference of the focus position. Therefore, FE signals can be obtained by calculating differences of F3 and F4 from the following formula (10):

Please amend the paragraph of page 26 starting on line 32 as follows:

In the diffraction grating body shown in Figure 11, the base material 142 on which the diffraction grating 3 is formed and the base material 141 on which the hologram 4 is formed are prepared separately and both are bonded to each other. With this configuration, the base material 142 can be formed of a thin film of a material with high refractive index and for the base material 141 as a parent material, a cheap glass or resin can be used. Therefore, it is not easy to form a large volume of uniform materials and is possible to minimize the amount of use of an expensive material with high refractive index. Furthermore, in the diffraction grating in this case, since the rate of the base material 141 with a low refractive index is increased, it is possible to obtain another effect in that the height of the diffractive grating body can be lowered.

IN THE CLAIMS

Please amend claims 10 and 11 to read as follows:

10.(amended) A semiconductor laser apparatus provided with a diffraction grating body according to any one of claim 1, comprising:

a semiconductor laser for emitting a light beam with wavelength $\lambda 1$ and a light beam with wavelength $\lambda 2$; and

a photodetector for receiving the light beams emitted from the semiconductor laser and carrying out photoelectric conversion; wherein:

the diffraction grating body receives the light beam with wavelength λ2 and transmits a main beam and generates sub-beams that are ±first order diffracted light; and

the diffraction grating body, the semiconductor laser and the photodetector are integrated into one package.

11.(amended) An optical pick-up provided with a diffraction grating body according to any one of claim 1, comprising:

a first semiconductor laser light source for emitting a light beam with wavelength λ1;

a second semiconductor laser light source for emitting a light beam with wavelength λ2;

an optical system for receiving the light beam with wavelength λ1 and the light beam with wavelength λ2 and converging the light beam onto a microspot on the optical disk;

a diffraction means for diffracting a light beam reflected from the optical disk; and

a photodetector having a photo detecting portion for receiving the diffracted light diffracted by the diffraction means to output electrical signals in accordance with the amount of the diffracted light; wherein

the diffraction grating body receives the light beam with wavelength λ2 and transmits a main beam and generates sub-beams that are ±first order diffracted light.

Please add claims 15-16 as follows:

15.(new) A semiconductor laser apparatus provided with a diffraction grating body according to claim 7, comprising:

a semiconductor laser for emitting a light beam with wavelength λ1 and a light beam with wavelength λ2; and

a photodetector for receiving the light beams emitted from the semiconductor

laser and carrying out photoelectric conversion; wherein:

the diffraction grating body receives the light beam with wavelength λ2 and transmits a main beam and generates sub-beams that are ±first order diffracted light; and

the diffraction grating body, the semiconductor laser and the photodetector are integrated into one package.

11.(new) An optical pick-up provided with a diffraction grating body according to claim 7, comprising:

a first semiconductor laser light source for emitting a light beam with wavelength λ1;

a second semiconductor laser light source for emitting a light beam with wavelength λ2;

an optical system for receiving the light beam with wavelength λ1 and the light beam with wavelength λ2 and converging the light beam onto a microspot on the optical disk;

a diffraction means for diffracting a light beam reflected from the optical disk; and

a photodetector having a photo detecting portion for receiving the diffracted light diffracted by the diffraction means to output electrical signals in accordance with the amount of the diffracted light; wherein

the diffraction grating body receives the light beam with wavelength λ2 and transmits a main beam and generates sub-beams that are ±first order diffracted light.

REMARKS

The above preliminary amendment is made to remove multiple dependencies from claims 10 and 11 and to correct some editorial issues in the specification.

Applicants respectfully request that the preliminary amendment described herein be entered into the record prior to calculation of the filing fee and prior to examination and consideration of the above-identified application.

If a telephone conference would be helpful in resolving any issues concerning this communication, please contact Applicants' primary attorney-of record, Douglas P. Mueller (Reg. No. 30,300), at (612) 371.5237.

Respectfully submitted,

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Dated: March 25, 2002

By _____
Douglas P. Mueller
Reg. No. 30,300

D. Mueller:hb

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MARK-UP VERSION SHOWING THE CHANGES MADE

IN THE SPECIFICATION

Please amend the paragraph of page 7 starting on line 32 as follows:

Furthermore, ~~the diffraction grating body according to claim 1, further comprising~~ it is preferable that an anti-reflection film in the interface between the base material having a refractive index n1 and the air, and the interface between the base material having the refractive index n1 and the base material having a refractive index n0. With such a diffraction grating, the transmissivity can be improved securely.

please amend the paragraph of page 9 starting on line 14 as follows:

Furthermore, the optical pick-up according to the present invention is provided with each of the above-mentioned diffraction grating bodies and includes a first semiconductor laser light source for emitting a light beam with wavelength $\lambda 1$; a second semiconductor laser light source for emitting a light beam with wavelength ~~$\lambda 1$~~ $\lambda 2$; an optical system for receiving the light beam with wavelength $\lambda 1$ and the light beam with wavelength $\lambda 2$ and converging the light beam onto a microspot on the optical disk; a diffraction means for diffracting a light beam reflected from the optical disk; and a photodetector having a photo detecting portion for receiving the diffracted light diffracted by the diffraction means to output electrical signals in accordance with the amount of the diffracted light; wherein the diffraction grating body receives the light beam with wavelength $\lambda 2$ and transmits a main beam and generates sub-beams that are $\pm$first order diffracted light.

Please amend the paragraph of page 19 starting on line 21 as follows:

P4A, P4B, P4C and P4D are +first order diffracted light diffracted by the hologram 4. M4A, M4B, M4C and M4D are -first order diffracted light diffracted by the hologram 4. The hologram 4 is divided into at least four parts by an x-axis and a y-axis. The hologram is designed so that P4A and M4A are diffracted by the region 4A, P4B and M4B are diffracted by the region 4B, P4C and M4C are diffracted by the region 4C, and P4D and M4D are diffracted by the region 4D. In Figure 8, only a part of the hologram 4 is shown as an ~~infrared~~ red light 4R on the hologram. The hologram 4 is formed in a range broader than 4R.

Please amend the paragraph of page 22 starting on line 27 as follows:

Furthermore, by forming the region 82 of the five strip-shaped divided regions, it is possible to separate the diffracted light M4D from the diffracted light M4A appropriately. Furthermore, it is possible to separate the diffracted light ~~M4D~~ M4B from the diffracted light ~~M4A~~ M4C appropriately. Accordingly, the conjugated lights thereof can be separated, that is, the diffracted light P4D can be separated from P4A appropriately. Similarly, the diffracted light P4B can be separated from P4C appropriately. Therefore, in the photo detecting portion 81, signals of the four diffracted lights can be detected separately and thus TE signals can be obtained by the phase difference method more excellently.

Please amend the paragraph of page 22 starting on line 37 as follows:

Figure 10 shows an operation of recording or reproducing information from a CD optical disk by allowing an infrared light to be emitted in the same configuration as in Figure 8. When the gap between the CD optical disk 72 and the objection lens in the direction of the optical axis is shifted, that is, when defocusing occurs, the magnitude of the diffracted light on the photo detecting portion ~~82~~ 83 changes. The change is a reverse movement with respect to the difference of the focus position. Therefore, FE signals can be obtained by calculating differences of F3 and F4 from the following formula (10):

Please amend the paragraph of page 26 starting on line 32 as follows:

In the diffraction grating body shown in Figure 11, the base material 142 on which the diffraction grating 3 is formed and the base material 141 on which the hologram 4 is formed are prepared separately and both are bonded to each other. With this configuration, the base material 142 can be formed of a thin film of a material with high refractive index and for the base material ~~142~~ 141 as a parent material, a cheap glass or resin can be used. Therefore, it is not easy to form a large volume of uniform materials and is possible to minimize the amount of use of an expensive material with high refractive index. Furthermore, in the diffraction grating in this case, since the rate of the base material 141 with a low refractive index is increased, it is possible to obtain another effect in that the height of the diffractive grating body can be lowered.

IN THE CLAIMS

Please amend claims 10 and 11 to read as follows:

10.(amended) A semiconductor laser apparatus provided with a diffraction grating body according to ~~any one of claims~~ claim 1 ~~to 9~~, comprising:

a semiconductor laser for emitting a light beam with wavelength $\lambda 1$ and a light beam with wavelength $\lambda 2$; and

a photodetector for receiving the light beams emitted from the semiconductor laser and carrying out photoelectric conversion; wherein:

the diffraction grating body receives the light beam with wavelength $\lambda 2$ and transmits a main beam and generates sub-beams that are $\pm$first order diffracted light; and

the diffraction grating body, the semiconductor laser and the photodetector are integrated into one package.

11.(amended) An optical pick-up provided with a diffraction grating body according to ~~any one of claims~~ claim 1 ~~to 9~~, comprising:

a first semiconductor laser light source for emitting a light beam with wavelength $\lambda 1$;

a second semiconductor laser light source for emitting a light beam with wavelength ~~λ1~~ λ2;

an optical system for receiving the light beam with wavelength λ1 and the light beam with wavelength λ2 and converging the light beam onto a microspot on the optical disk;

a diffraction means for diffracting a light beam reflected from the optical disk; and

a photodetector having a photo detecting portion for receiving the diffracted light diffracted by the diffraction means to output electrical signals in accordance with the amount of the diffracted light; wherein

the diffraction grating body receives the light beam with wavelength λ2 and transmits a main beam and generates sub-beams that are ±first order diffracted light.